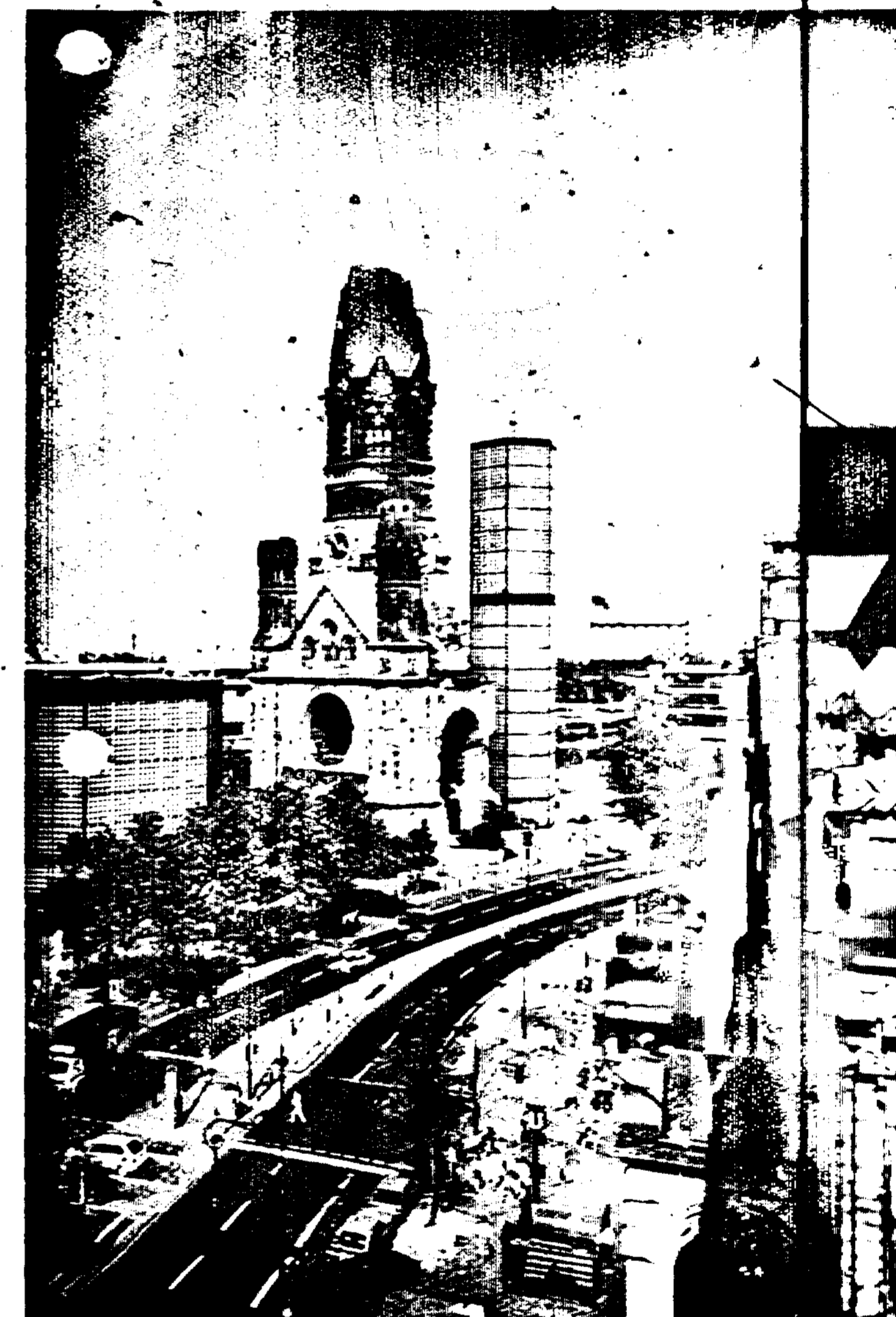


# INDOOR AIR '87

17-21 August 1987, Berlin (West)

## Final Programme



**Conference Secretariat**  
CPO Hanser Service GmbH  
Schaumburgallee 12  
D-1000 Berlin 19  
Telephone: (030) 305 31 31  
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Telex: 186 111 cpo d

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**The 4th International Conference on  
Indoor Air Quality and Climate  
INDOOR AIR '87  
17-21 August 1987, Berlin (West)**

**Under the Auspices of:**  
World Health Organization  
Commission of the European Communities

**Organized by:**  
Institute for Water, Soil and Air Hygiene

**Sponsored by:**  
Federal Minister for the Environment, Nature Conservation  
and Reactor Safety (D)  
Senate of Berlin (D)  
Air Pollution Control Association (USA)  
American Society of Heating, Refrigerating and  
Air-Conditioning Engineers (USA)  
Department of Energy (USA)  
Environmental Protection Agency (USA)  
Representatives of European Heating and  
Ventilation Associations  
Association of German Engineers, VDI (D)  
Commission on Air Pollution Prevention  
Society for Technical Building Services  
Cooperative Foundation against Environmental  
Pollution (Japan)  
Electric Power Research Institute (USA)  
Gas Research Institute (USA)  
Drägerwerk AG (D)



**Exhibitors**

**Antechnika Analytische Geräte GmbH**  
Nobelstr. 3, D-7505 Ettlingen

**Bioclimatic GmbH**  
Rodenberger Allee 30, D-3052 Bad Nenndorf

**Biocontrol**  
Postfach 16 30, D-6500 Mainz

**Brüel & Kjaer GmbH**  
Birkenweg 3-5, D-2085 Quickborn

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**Drägerwerk Aktiengesellschaft**  
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Box 81001, S-104 81 Stockholm

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Schlossheide 42, D-6222 Geisenheim-Johannisberg

**Kuns GmbH & Co.**  
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Georg-Wilhelm-Str. 3, D-1000 Berlin 31

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2 Science Rd., Glenwood, Illinois 60225, USA

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Zieglerstr. 1, D-5100 Aachen

**Unisearch Assoc., Inc.**  
Concord, Ontario, Canada - L4K 1B5

**Vent Axia Ltd.**  
Fleming Way Crawley, West Sussex RH10 2NN, GB

Included in the Conference material is a brochure of:

**E & T, Energie- und Transporttechnik GmbH**  
Wesloer Str. 12, D-2400 Lübeck

## General Information

### Cars and Parking

Cars may be parked in the car park of the ICC. You can reach the entrance to the car park from Kurfürstendamm/Rathenauplatz or from the south via the "Avus" and "Stadtring" motorways. The parking fee is DM 4 per day; please have your parking ticket stamped at the Information Desk in the entrance hall.

### Public Transportation/Taxi

Berlin has a well-developed public transportation network based on buses, underground and suburban trains.

The ICC is linked to the downtown area by bus no. 94 (other buses passing by the ICC are nos. 4, 10 and 65). To reach the ICC by underground (Linie U1 to the Kaiserdamm Station) or by the suburban train (Linie S3 to the Westkreuz Station), requires a short walk.

There will be no Conference shuttle buses to the ICC.

Bus no. 9 is an express airport bus with direct connections to the major downtown hotels.

There is a special taxi ramp at the arrival level of the ICC. Please, contact one of the hostesses at the Information Desk of the ICC if you need a taxi.

A taxi ride from the ICC to the airport costs approximately DM 18, while a ride to the downtown area costs around DM 15.

### Organizing Committee

Dr. Bernd Seifert (President)  
Institute for Water, Soil and Air  
Hygiene, Berlin (D)

Professor Horst Esdorn  
Hermann Rietschel Institute  
of Heating and Air Conditioning  
Technical University, Berlin (D)

Dr. Manfred Fischer  
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Institute of Hygiene  
Free University, Berlin (D)  
Technical University, Berlin (D)

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Institute for Water, Soil and Air  
Hygiene, Berlin (D)

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Copenhagen (DK)

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Department of Air Pollution  
Agricultural University  
Wageningen (NL)

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Laboratory of Heating and  
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Technical University of Denmark  
Lyngby (DK)

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Laboratory of Environmental  
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Occupational Health, Zagreb (YU)

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Lawrence Berkeley Laboratory  
Berkeley (USA)

Dr. Helmut Knöppel  
Joint Research Centre  
Commission of the European  
Communities, Ispra (I)

Dr. Arvo Lannus  
Electric Power Research Institute  
Palo Alto (USA)

Professor Michael D. Lebowitz  
Health Sciences Center  
University of Arizona  
Tucson (USA)

### Overseas Coordinators

Professor Kazuo Maeda  
Department of Epidemiology  
School of Health Sciences  
University of Tokyo  
Tokyo (J)

Dr. Demetrios Moschandreas  
IIT Research Institute  
Chicago (USA)

Jan Sundell, M.Sc.  
National Board of Occupational  
Safety and Health  
Solna (S)

Dr. Peter Warren  
Building Research Establishment  
Watford (GB)

Professor Thomas Lindvall  
Karolinska Institute and National  
Institute of Environmental  
Medicine, Stockholm (S)

Professor Giselher von Nöding  
Institute for Water, Soil and Air  
Hygiene, Berlin (D)

Professor Eystein Rødahl  
Norwegian Institute of Technology  
University of Trondheim  
Trondheim (N)

Dr. Susan Rose  
Department of Energy  
Germantown (USA)

Professor John D. Spengler  
School of Public Health  
Harvard University, Boston (USA)

Professor Jan A.J. Stolwijk  
School of Medicine  
Yale University, New Haven (USA)

Dr. Michael J. Suess  
World Health Organization  
Copenhagen (DK)

Dr. W. Gene Tucker  
Environmental Protection Agency  
Research Triangle Park (USA)

Dr. Douglas Walkinshaw  
National Research Council  
Ottawa (CDN)

Dr. Susumu Yoshizawa  
Institute of Public Health, Tokyo (J)

Dr. Cary Young  
Electric Power Research Institute  
Palo Alto (USA)



## General Information

### Submission of Slides

All speakers are kindly requested to submit their slides to the Slide Check which is next to the Registration Counter. Slides should be delivered at least two hours before the beginning of the respective session. They should be collected on the same day until 18:00 hours. Overheads should be kept by the speakers to be presented from the podium.

### Exhibition

The Conference is augmented by an Exhibition of equipment, scientific instrumentation and special products, which is in the foyer of Hall 3. Visiting of the Exhibition is highly recommended to the participants. Opening hours are daily from 8:30 to 18:00 hours. A list of exhibitors is contained in this Programme.

### Social and Supporting Programmes

Tickets for the Social Programme and the Supporting Programme are available at the Registration Counter.

### Food and Beverages

Together with the Conference material, participants receive eight vouchers for coffee or tea. These vouchers may be used at any of the snack bars of the ICC:

Meeting Point Bar in the entrance hall next to the Registration Counter,  
Conference Bar in the foyer of Hall 3 in the Exhibition area,  
Coffee booth in the main foyer next to the poster area.

During lunch time, snacks are available at the Conference Bar in the foyer of Hall 3. In addition, the ICC offers a self-service restaurant ("Nipkow") in the entrance hall behind the Registration Counter, and the more fashionable "Pullmann" restaurant. The Registration Counter is at your disposition for a list of restaurants outside the ICC.

At the time of printing of this Programme, the possibility of spending your lunch break outdoors on the Roof Terrace was not excluded. Please try!

	Lunch	Lunch	Lunch	Lunch	End of Conference
Afternoon					
	S: Radon S: Multicomponent Studies S: Hyperreactivities & Allergies	PL: Air-conditioning PL: Sick Buildings S: Combustion Gases S: Guaranteeing Adequate IAQ S: IAP in Developing Countries	PL: Indoor Air Pollution Control S: Policy & Strategies S: Controls S: Microbiological Pollutants	Symposia Summaries PL: Indoor Air Pollution Control S: Policy & Strategies S: Controls S: Microbiological Pollutants	
	P: Thermal Climate P: Volatile Organic Compounds P: Particles & Fibres P: Combustion Gases: Sources & Sinks	P: Hyperreactivities & Allergies P: Radon: Surveys P: Sick Buildings: IAQ Research P: Semi-volatile Organics	P: Ventilation Effectiveness F: Sources of Volatile Organics P: Odours, Irritants & HCHO	P: Ventilation Effectiveness F: Sources of Volatile Organics P: Odours, Irritants & HCHO	
Evening	Reception by the Senate of Berlin	Free	Social: "Indoors go out"	W: Danish Town Hall Study Free	

Symposia, Poster Sessions and Workshops of each half-day are kept in parallel.

Abbreviations:  
PL: Plenary Lecture  
S: Symposium  
P: Poster Session  
W: Workshop

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## Scientific Programme



## General Information

### Name Tags

Conference participants are requested to wear their name tags at all times within the ICC, since admission to all events will be controlled. The colours of the tags have the following meaning:

Yellow:	Conference participant
Blue:	Chairman, Symposium Organizer
Green:	Accompanying person
Red:	Staff

### Conference Language

The official language of the Conference is English. A simultaneous translation into and from German is provided for all events in Hall 3.

### Proceedings

The Proceedings of the Conference are printed in 4 volumes. One full set is delivered free of charge to every fully registered participant. Additional sets may be obtained at the Registration Counter for DM 124 each. Volumes will not be sold separately.

### List of Participants

A list of participants is enclosed in the Conference material. A supplement will be available at the Registration Counter on Friday, 21 August 1987.

### Poster Sessions

A short oral introduction (5 min.) of each poster at a session will be given in the respective lecture hall. The subsequent discussion of the session's posters will take place in one of the areas from A to H, where posters will be on permanent display. To identify the location of the different areas, please refer to the information sheet included in your Conference material.

## Sunday, 16 August 1987

15:00 -	Registration
20:00 -	International Congress Centre ICC Berlin Counter, Entrance Hall
18:00 -	Get-Together Party
20:00	ICC, Dachgarten (Roof Garden)

## General Information

### Venue of the Conference

Internationales Congress Centrum ICC Berlin (West)  
Messedamm 22 (Entrance Neue Kantstraße)  
D-1000 Berlin 19  
Telephone: (030) 30 38-31 58

### Registration Counter/Conference Secretariat during the Conference

The Registration Counter is located on the "blue" side in the entrance hall of the ICC Berlin and is open at the following hours:

Sunday, 16 August 1987 15:00 - 20:00 hours  
Monday, 17 August 1987 until  
Thursday, 20 August 1987 8:00 - 18:00 hours  
Friday, 21 August 1987 8:00 - 13:00 hours

The Registration Counter provides all kinds of support for travel arrangements, room reservations and information concerning the city's cultural events.

After the Conference, the address of the Conference Secretariat will be the usual one:

CPO Hanser Service GmbH  
Schaumburgallee 12  
D-1000 Berlin 19  
Telephone: (030) 305 31 31  
Telefax: (030) 305 73 91  
Telex: 186 111 cpo d

### Official Carrier

PAN AM is the official airline of  
INDOOR AIR '87

### Conference Fees

Participant	DM 750
Author (one per paper)	DM 350
Accompanying Person (without access to Scientific Sessions)	DM 150



Monday, 17 August 1987

10:00 Opening Ceremony, Saal 3 (Hall 3)

### Opening Addresses by

Martin Grüner, Parliamentary State Secretary  
Ministry for the Environment, Nature  
Conservation and Reactor Safety, Bonn (D)  
Ulf Fink, Senator for Health and Social Services  
Berlin (D)  
George R. Bishop, Professor  
Joint Research Centre of the European  
Communities, Ispra (I)  
Michael J. Suess, Dr.  
World Health Organisation, Copenhagen (DK)

### Plenary Lectures, Saal 3 (Hall 3)

11:30 The Determination of Health Effects of  
Indoor Air Pollution  
J.A.J. Stolwijk, Professor, New Haven (USA)

12:00 Allergens in the Indoor Environment  
W. Jorde, Dr., Mönchengladbach (D)

14:00 Symposium, Saal 3 (Hall 3)

### Radon: A Solvable Problem?

Organizer: A.V. Nero Jr., Dr., Berkeley (USA)  
Chair: O. Castrén, Dr., Helsinki (SF)

### Presentations (15 min. each):

- Castrén O., Voutilainen A., Mäkeläinen I.  
A Seeking Strategy for High Indoor Radon  
Concentrations
- Steck D.J.  
Geological Variation of Radon Sources and  
Indoor Radon along the Southwestern Edge of  
the Canadian Shield
- Sextro R.G., Harrison J., Moed B.A.,  
Revzan K.L., Turk B.H., Grimsrud D.T.,  
Nero A.V., Sanchez D.C., Teichman K.Y.  
An Intensive Study of Radon and Remedial Meas-  
ures in New Jersey Homes: Preliminary Results

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## Monday, 17 August 1987

- Fortmann R.C., Nagda N.L., Harper J.P.  
Radon Mitigation Through Residential Pressurization Control Strategy
- Osborne M.C.  
Resolving the Radon Problem in Clinton, New Jersey, Houses
- Arvela H., Winqvist K.  
A Model for Indoor Radon Variations
- Fisk W.J., Mowris R.J.  
The Impacts of Balanced and Exhaust Mechanical Ventilation on Indoor Radon
- Hopke P.K., Chu K.-D.  
The Neutralization Behavior of Po-218 in Indoor Air

16:00 Break

16:30 Discussion

14:00 Symposium, Saal 4/5 (Room 4/5)

### Multicomponent Field and Laboratory Studies: Exposure and Health Effects

Organizer: J. Spengler, Professor, Boston (USA)  
Chair: D. Mage, Dr., Kuala Lumpur (Malaysia)

Presentations (15 min. each):

- Quackenboss J.J., Lebowitz M.D., Hayes C.  
Epidemiological Study of Respiratory Responses to Indoor-Outside Air Quality
- Glaser U., Hochrainer D., Müller J., Otto F.  
An Experimental Animal Study for Risk Assessment of Indoor Air Pollutants
- Englert N., Prescher K.-E., Seifert B.  
Indoor Air Quality and Respiratory Diseases in Children
- Šega K., Fugaš M.  
A Health Effect Oriented Multipollutant Human Exposure Study
- Dockery D.W., Spengler J.D., Speizer F.E., Ferris Jr. B.G., Ware J.H., Brunekreef B.  
Associations of Health Status with Indicators of Indoor Air Pollution from an Epidemiologic Study in Six U.S. Cities
- Grimsrud D.T., Turk B.H., Prill R.J., Harrison J., Revzan K.L.  
Effects of House Weatherization on Indoor Air Quality



## Supporting Programme

### Friday, 21 August 1987

9:00 -  
13:00

#### Royal Porcelain KPM

We will drive to the "Königliche Porzellan Manufaktur (KPM)". It is the second oldest porcelain manufacturing company in Germany founded in 1751. During our tour through the factory, the manufacturing and production process of fine porcelain will be shown and explained. The porcelain creations of the KPM from the Art Nouveau period through the 1930's will be particularly emphasized.

Not far from the KPM, a "Historical Fair" has been created as part of the "750-year Celebration". The history of Berlin amusements and entertainment has been called to life again and can be enjoyed in this re-creation of old Berlin: Kaiser Wilhelm's target shooting gallery, the Laterna Magica, the Circus at the Brandenburg Gate, and many lovingly restored stands and rides.

You may stroll through the Fair as long as you like, or return with us to the ICC or your hotel.

Tour begins at ICC and ends at ICC or hotels in the city centre.

Price per person: DM 26.

## Supporting Programme

### Thursday, 20 August 1987

- 8:30 - 19:00**     **Excursion to Potsdam**  
 We will travel by deluxe motor coach to Potsdam, the city which best reflects the brilliance of Prussian history in many different periods. After a city sightseeing tour, we will visit Sanssouci Park and Palace; Palace Cecilienhof, where the Potsdam Agreement was signed; and either the New Palace or Charlottenhof Palace. During our excursion, we will have lunch together at a typical local restaurant, and enjoy a popular German custom, "coffee and cake", at one of Potsdam's cafes in the afternoon.  
 Tour begins at ICC and ends at ICC or hotels in the city centre.  
 Price per person: DM 105.

- 9:30 - 12:30**     **Visit to the Dahlem Museum**  
 We will go by deluxe motor coach to the Dahlem Museum, located in Berlin's elegant suburban district Dahlem. The collection of the Picture Gallery is one of the most important in Germany, and contains masterpieces from the 13th to 18th centuries. One of the most beautiful collections is of 17th century Dutch painting, with works of Rembrandt, Vermeer, Frans Hals, Rubens and van Dyck.  
 The Sculpture Gallery collection contains many masterpieces of the occidental art tradition, including an early Christian Byzantine collection, sculpture from the early and middle Medieval period, important examples of miniature art, and a collection of 19th century sculpture.  
 We will be guided through the Dahlem Museum in small groups by expert museum guides.  
 Tour begins and ends at ICC.  
 Price per person: DM 26.



### Monday, 17 August 1987

- Harper J.P., Dudney C.S., Hawthorne A.R., Spengler J.D.  
 Energy Use/Weatherization and Indoor Air Quality: Field Study Results
- Spengler J.D., Ware J., Speizer F., Ferris B., Dockery D., Lebrecht E., Brunekreef B.  
 Harvard's Indoor Air Quality Respiratory Health Study

**16:00**     **Break**

**16:30**     **Discussion**

**14:00**     **Symposium, Saal 7 (Room 7)**

#### **Hyperreactivities and Allergies**

Organizer: H. Magnussen, Professor,  
 Großhansdorf (D)

Chair: C. Reed, Professor, Rochester (USA)

Presentations (15 min. each):

- Stock T.H., Morandi M.T.  
 Characterization of Aeroallergen Concentrations in Indoor and Outdoor Microenvironments
- Irie T., Ikeda K., Komine H., Takano A., Sakaguchi M., Inoue T., Kawashima Y., Yoshikawa M.  
 Relation between Childhood Asthma and Indoor Environmental Elements in Dwellings
- Hansen J., Bach E., Kaa Ibsen K., Østerballe O.  
 Carpeting in Schools as an Indoor Pollutant
- Kniest F.M.  
 Colorimetric Quantification of Inhalant Allergen Sources in House Dust
- Pauli G., Bessot J.C., Tenabene A., Kairouani N.  
 Indoor Mite Pollution and Mite Asthma
- Bischoff E.  
 Sources of Pollution of Indoor Air by Mite Allergen Containing House Dust
- van Brønswijk J.E.M.H.  
 Towards Hygienic Standards for the Allergenicity of the Indoor Environment

**15:45**     **Break**

**16:15**     **Discussion**

## Monday, 17 August 1987

14:00 Poster Session, Saal 6 (Room 6)

### Thermal Climate and Comfort

#### Co-Chairpersons:

B.W. Olesen, Dr., Lyngby (DK)  
D.N. Phong, Professor, Hanoi (P.R. Vietnam)

#### Presentations (5 min. each):

- Berglund L.G., Fobelets A.P.  
Floor Drafts from Cold Walls
- Göthe C.-J., Ancker K., Bjurström R., Holm S.,  
Langworth S.  
Relative Humidity, Temperature and Subjective  
Perceptions of "Dry Air"
- Halahyja M., Piršelj L.  
Operative Temperature - The Most Suitable Way  
for Practical Civil Engineering?
- Hygge S.  
Interactions of Noise and Thermal Factors on  
Human Behavior
- Jokl M.V.  
An New "COMECON" Standard for Thermal  
Comfort within Residential and Civic Buildings
- Lakomy T.  
Experimental Results of an Influence of Air and  
Radiant Temperatures on Men Thermal  
Sensations in Flats
- Lord D.  
Archetypes of Environmental Tempering:  
The Cultural Significance of Indoor Air  
Quality
- Mayer E.  
Air Velocity and Thermal Comfort
- Olesen B.W.  
A New Nordic Standard Proposal for Measuring  
the Thermal Characteristics of Clothing
- Petraš D.  
Subjective Evaluation of Thermal Comfort and  
its Relation to Energy Consumption for Heating  
in Dwellings
- Sagae A., Ohara S., Togari S., Nagatomo M.  
Estimation of Indoor Thermal Environment in  
Office Spaces
- Tanabe S.-I., Kimura K.-I., Hara T., Akimoto T.  
Effects of Air Movement on Thermal Comfort  
During the Summer Season



## Supporting Programme

## Tuesday, 18 August 1987

20:00

### "Zauber Zauber" Theater des Westens

The art of magic was still a popular entertainment and cultural attraction during the first half of this century, and had its own theatres and international celebrities. But this art is slowly dying out in a world in which pragmatism, science and rationality have become ever more important. The magic show "Zauber Zauber" brings back this almost forgotten tradition to its audience. "Zauber Zauber" is something more than simple entertainment, though it is indeed fascinating entertainment. It is the revival of an old cultural and historical tradition, and the art of believing in "miracles".  
Price per person: DM 42.

## Wednesday, 19 August 1987

8:30 -  
13:00

### City Sightseeing Tour Berlin (East)

We will visit the historical centre of Berlin and be introduced to the city during a guided bus tour. Many historical buildings have been restored in time for the "750-year Celebration". During our sightseeing trip, you will see such famous buildings as the State Opera House, Humboldt University, the Museum of German History (formerly the Zeughaus), the City Hall, the Cathedral . . . The tour includes a visit to the Pergamon Museum which houses the famous Pergamon Altar, the Market Gate of Milet, and the Ishtar Gate of ancient Babylonia.  
Tour begins and ends at ICC.  
Price per person: DM 46.

## Supporting Programme

### Monday, 17 August 1987

- 14:00 - 17:00** **Big City Sightseeing Tour of Berlin (West)**  
In a deluxe motor coach, you will see many of the highlights of Berlin as we drive through the city: Kurfürstendamm, Gedächtniskirche (Memorial Church), Schöneberg City Hall... We will visit the district of Kreuzberg and see the beautifully restored housing projects "Riehmers Hofgarten" and "Chamissoplatz" which have unique historical and architectural features. We will go on to see the Brandenburg Gate, the Reichstag, the Wall, Bellevue Palace, the Hansa Quarter, Charlottenburg Palace and the Olympic Stadium. Tour begins and ends at ICC. Price per person: DM 28.

### Tuesday, 18 August 1987

- 9:30 - 16:00** **Berlin historic**  
Our excursion begins with a visit to the Martin-Gropius-Building. Its 40 rooms currently house an exhibition of the history of Berlin, from its beginnings in the early 13th century up to the present day. This is the main historical exhibition of the "750-year Celebration", which offers a comprehensive picture of the varied political and cultural development of what was once Germany's capital. After a guided tour of the exhibition, we will enjoy a light lunch in the museum restaurant. To round-out and complement our museum visit, we will take a city sightseeing tour in the afternoon through Berlin (West), which will highlight the cultural and historical sights of the city. This tour will be led by specially trained and knowledgeable guides, one whose special area is the history of Berlin, the other is an expert who will inform you about the Martin-Gropius-Building and its current exhibition. Tour begins at ICC and ends at ICC or hotels in the city centre. Price per person: DM 98.



### Monday, 17 August 1987

- Yilmaz Z.  
Design Principles for Thermally Comfortable Indoor Spaces
- Yoshino H., Matsumoto H., Makita K., Hasegawa F., Utsami Y., Akabayashi S.-I.  
Investigation of Indoor Thermal Environment, Air Quality and Energy Consumption in Highly Insulated Detached Houses in Japan

**15:30** **Break**

**16:00** **Discussion at Poster Walls (Area F1)**

**14:00** **Poster Session, Saal 8 (Room 8)**

#### Volatile Organic Compounds

Co-Chairpersons:

- L. Mølhave, Dr., Århus (DK)
- J. Lewtas, Dr., Research Triangle Park (USA)

Presentations (5 min. each):

- Brugnone F., Perbellini L., Faccini G.B., Pasini F.  
Benzene in the Breath and Blood of General Public
- De Bortoli M., Knöppel H., Pecchio E., Vissers H.  
Performance of a Thermally Desorbable Diffusion Sampler for Personal and Indoor Air Monitoring
- Jungers R.H., Sheldon L.S.  
Characterization of Volatile Organic Chemicals in Public Access Buildings
- Mailahn W., Seifert B., Ullrich D.  
The Use of a Passive Sampler for the Simultaneous Determination of Long-Term Ventilation Rates and VOC Concentrations
- Matthews T.G., Thompson C.V., Wilson D.L., Hawthorne A.R., Mage D.T.  
Air Velocities Inside Domestic Environments: An Important Parameter for Passive Sampling
- Mierzwinski S., Breum N.O., Madsen Th.L.  
Personal Exposure due to Solvent Spillage on Clothing
- Pleil J.D., Oliver K.D., McClenny W.A.  
Time-Resolved Measurement of Indoor Exposure to Volatile Organic Compounds

## Monday, 17 August 1987

- Ullrich D., Liu Z.-F., Seifert B.  
Assessment of the Indoor Air Concentration of an Organic Substance Emitted from a Continuous Source using Methyl Benzoate as an Example
- Verhoeff A., Suk H., van Wijnen J.  
Organic Solvents in the Indoor Air of Ten Small Screen Printing Plants and Surrounding Houses
- Wallace L., Clayton C.A.  
Volatile Organic Compounds in 600 US Homes: Major Sources of Personal Exposure
- Wallace L., Jungers R., Sheldon L., Pellizzari E.  
Volatile Organic Chemicals in 10 Public-Access Buildings

15:15 Break

15:45 Discussion at the Poster Walls (Area A1)

14:00 Poster Session, Saal 9 (Room 9)

### Particulate Matter and Fibres

#### Co-Chairpersons:

- H. Bossenmayer, Dr., Stuttgart (D)
- J.J. Quackenboss, Dr., Tucson (USA)

#### Presentations (5 min. each):

- Aalykke C., Kahr O., Lundqvist G.R.  
Type of Floor Airborne and Settling Particulates in a Day-Care Institution
- Al-Mutaz I.S.  
CO, Particulates, Lead Levels in the Indoor Environment in Riyadh, Saudi Arabia
- Bluysen P., van de Loo H., Leaderer B.P.  
Chamber and Field Studies of Respirable Suspended Particulate Deposition Rates Indoors
- DiNardi S.R., Ludwig J., Neumann R.  
Monitoring Respirable Suspended Particles in the Indoor Environment
- Fujii S., Tarumi H., Kim K.Y., Hayakawa I.  
Measurements of Submicron Particles by CNC and Diffusion Battery



## Supporting Programme

In 1987, Berlin is commemorating its 750-year history as a city. A large number of special events (art and scientific exhibitions, music and city festivals) take place. Those who wish to participate at these events during the Conference or while staying a few days longer in Berlin, may obtain information about the programme of the "750-year Celebration" at the Registration Counter.

To book one of the following tours, please contact also the Registration Counter.

## Sunday, 16 August 1987

16:30 -  
18:00

### City Sightseeing Tour of Berlin (West)

Early Birds can get an initial whiff of the famous "Berliner Luft", the Berlin atmosphere. During a short sightseeing tour through the centre of Berlin, you will get an introduction to the city, and a first impression of what you can expect in the coming days. You will return to the ICC in time for the Get-together Party.

Tour begins and ends at ICC.

Price per person: DM 22.

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## Social Programme

19:30

Arrival at the Spandau Citadel.

We spend the evening together at the Spandau Citadel, a 16th century fortress. Hot and cold food specialties, wine and beer await you in a rustic setting. You will experience a taste of the city as it was centuries ago.

From  
22:00

Return by coach to ICC and hotels in the city center.

Informal dress is suggested. As old fortresses tend to have been built without considering modern rules of air-conditioning, and no kerosene heaters will be provided for obvious reasons, bringing a warm sweater is highly recommended.

Contribution for Conference participants per person: DM 50.  
For registered accompanying persons the evening is free.  
Fee for non-registered guests per person: DM 90.



Monday, 17 August 1987

- Kulmala M., Saari H., Raunemaa T., Olin M.  
Indoor Air Aerosols: Outdoor Air Influence on Indoor Air
- Lebret E., McCarthy J., Spengler J., Chang B.-H.  
Elemental Composition of Indoor Fine Particles
- McCarthy S.M.  
Multivariate Analyses of Indoor and Outdoor Aerosols: A Comparison of Cluster and Factor Analytic Results
- Nielsen O.  
Man-Made Mineral Fibres in the Indoor Climate Caused by Ceilings of Man-Made Mineral Wool
- Ozao S., Nirei T., Yamagishi N., Yoshizawa S., Irie T., Sugawara F.  
Study on Pollution by Airborne Particulate Matter in Subway Stations
- Rindel A., Hugod C., Bach E., Breum N.  
MMMF-Ceilings in Kindergartens - Health Effect
- Schneider T., Eriksen P., Vinzents P., Peterson O.H., Kofoed Hansen B.  
Easy Method for Measuring the Quality of Cleaning
- Schultz E.  
Quantitative Microscopic Analysis of Indoor Particle Deposition Samples
- Šega K., Kalinić N., Šišović A.  
Indoor Concentrations of Total Suspended Particulate Matter, Respirable Particles and Smoke in Kindergartens and Primary Schools
- Turk B.H., Grimsrud D.T., Brown J.T., Geisling-Sobotka K.L., Harrison J., Prill R.J.  
Commercial Building Ventilation Rates and Particle Concentrations

15:30

Break

16:00

Discussion at the Poster Walls (Area H 1)

## Monday, 17 August 1987

14:00 Poster Session, Saal 10 (Room 10)

### Combustion Gases: Sources and Sinks

#### Co-Chairpersons:

B. Brunekreef, Dr., Wageningen (NL)  
B.P. Leaderer, Professor, New Haven (USA)

#### Presentations (5 min. each):

- Billick I.H., Nagda N.L.  
Reaction Decay of Nitrogen Dioxide
- Borrazzo J.E., Davidson C.I., Hendrickson C.T.  
A Statistical Analysis of Published Gas Stove  
Emission Factors for CO, NO, NO<sub>2</sub>
- Borrazzo J.E., Peters C., Peck S., Davidson C.I.  
Determination of NO<sub>2</sub> Loss Rates from  
Concentration Measurements in an Occupied  
Urban Residence
- Dave J.M.  
Emissions from Conventional Kerosene Stove  
Used in Indian Kitchen
- Gundel L.A., Somorjai N., Novakov T.  
The Interaction of Nitrogen Oxides with  
Particles: Chemical Transformation on Activated  
Carbon and Alumina Surfaces
- Hoogenboezem C.G., Dietz R.N., D'Ottavio T.W.,  
Goodrich R.W.  
Two-Zone Modelling for Air Exchange Rates  
and NO<sub>2</sub> Source and Decay Rates in a Southern  
California Residential Indoor Air Quality Study
- Macnair R.A., Elkins R.H., Billick I.H.  
Effect of Level of Air Infiltration on CO and NO  
Emissions from Unvented Gas Space Heaters in  
Mass-Balance (Chamber) Measurements
- Moschandreas D.J., Relwani S.M.  
Field Measurements of NO<sub>2</sub> Gas Range Top  
Burners Emission Rates
- Naudeix D.  
Limits of Carbon Monoxide and Dioxide from  
Unvented Instantaneous Water Heaters
- Rau J.A., Huntzicker J.J.  
Composition and Size Distribution of Residential  
Wood Smoke Particles
- Rowe R.  
Solid and Gaseous Emissions from Wood Fired  
Boilers



## Social Programme

### Sunday, 16 August 1987

18:00 -  
20:00

Get-together Party  
International Congress Centre ICC Berlin  
Dachgarten (Roof Garden)

### Monday, 17 August 1987

18:00

Departure by coach from the ICC Berlin

19:00

Reception given by the Senate of Berlin  
in the "Reichstag" Building  
(former House of Parliament)

Return by coach to hotels in the city center  
and ICC.

### Wednesday, 19 August 1987

#### Social: Indoorers go out

16

Departure by coach from ICC and hotels Bristol  
Kempinski, Econtel, Excelsior, Novotel Airport.

We start by driving through part of "green" Berlin,  
Grünwald Forest, to Berlin's famous recreational  
lake, the Wannsee.

17:00

Departure by boat from the landing stages at  
Wannsee Station (suburban trains S1 and S3).

We travel by ship on the River Havel to the old  
quarter of the Spandau district. A short walk  
brings us to the Spandau Citadel.

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## Friday, 21 August 1987

- McCarthy J., Spengler J., Chang B.-H., Coultas D., Samet J.  
A Personal Monitoring Study to Assess Exposure to Environmental Tobacco Smoke
- Moschandreas D.J., Sterling D.A., Gibbons R.D.  
Perception of Daily Cigarette Consumption
- Reckendorf H.  
Indoor Air Pollution through Smoking: A Challenge to Industrial Medicine
- Revsbech P., Korsgaard J., Lundqvist G.R.  
Tobacco Smoking and the Indoor Suspended Particulate Matter
- Schlatter J., Wanner H.-U.  
Strategies to Avoid Negative Health Effects of Passive Smoking
- Schmidt F.  
Passive Smoking as a Scientific, Political, Juridical and Economic Problem
- Vu Duc T., Huynh C.K.  
Sidestream Tobacco Smoke Constituents in Indoor Air Modelled in an Experimental Chamber
- Witorsch R., Witorsch P.  
Maternal Smoking and Pulmonary Performance in Children: A Critical Analysis

11:00 Break

11:30 Discussion at Poster Walls (Area D 5)

12:30 **Symposia Summaries, Saal 3 (Hall 3)**  
(Symposia of Thursday Afternoon)  
Chair: B. Berglund, Dr., Stockholm (S)

13:00 End of Conference



## Monday, 17 August 1987

- Sharma S.P., Parikh P.P., Baruah P.C.  
Vitiating of Combustion Air and Its Effect on the Performance of a Gas Stove
- Spicer C.W., Coutant R.W., Ward G.F., Joseph D.W., Gaynor A.J., Billick I.H.  
Rates and Mechanisms of NO<sub>x</sub> Removal From Indoor Air by Residential Materials
- Yanagisawa Y., Fasano A.M., Spengler J.D., Ryan P.B., Billick I.H.  
Removal of Nitrogen Dioxide by Interior Materials

15:30 Break

16:00 Discussion at Poster Walls (Area C 1)

18:00 Departure by coach from ICC Berlin

19:00 **Reception given by the Senate of Berlin at "Reichstag" building**  
Return by coach to "Bahnhof Zoo", some hotels in the city centre and ICC.

## Tuesday, 18 August 1987

8:30 **Symposia Summaries, Saal 3 (Hall 3)**  
(Symposia of Monday Afternoon)  
Chair: B. Berglund, Dr., Stockholm (S)

**Plenary Lecture, Saal 3 (Hall 3)**

9:00 **What Architects Can do to Improve Indoor Air Quality**  
H. Levin, Dr., Berkeley (USA)

9:45 **Symposium, Saal 3 (Hall 3)**

**Thermal Climate and Comfort**

Organizer: D. Wyon, Dr., Gävle (S)

Chair: P.O. Fanger, Professor, Lyngby (DK)

Presentations (15 min. each):

- Ohgke H., Trommler T., Beckert J.  
An Attempt to Define Thermal Comfort for Severely Compromised Patients on Artificial Respiration
- de Dear R.J., Tanabe S., Knudsen H.N., Pejtersen J.H., Mackeprang J., Fanger P.O.  
Thermal Response of Wool Clothing During Humidity Transients
- Fanger P.O., Melikow A.K., Hanzawa H.  
Draught and Turbulence
- Ishii A., Katayama T., Tsutsumi J.-I., Nishida M., Sakakibara N.  
Estimation of Thermal Environment in a Naturally Ventilated Room with Windows Opened by Using Data from Full-Scale Measurements
- Sakakibara N., Ishii A., Katayama T., Tsutsumi J.-I., Nishida M.  
Experimental Study on Thermal Sensation of Human Body in Naturally Ventilated Rooms
- Berglund L.G., Fobelets A.P.  
Occupant Acceptance of Air Motion and Asymmetric Radiation in Neutral and Cool Environments
- Kähkönen E., Ilmarinen R.  
Indoor Thermal Climate in Shops and Stores



## Friday, 21 August 1987

- Kunz C.  
Indoor Radon: The Diurnal Cycle
- Mocsy L., Fulea C., Simon K.  
The Influence of Ventilation in Rooms upon the Effective Dose Equivalent from Inhalation of <sup>222</sup>Rn and their Short Lived Daughters
- Swedjemark G.A., Wahren H., Mäkitalo A., Tell W., Melander E.  
Experiences from Indoor Radon-Daughter Limitation Schemes in Sweden
- Yokoyama S., Ochifuji K.  
A Study of Indoor Radon and Radon Daughter Concentrations in Hokkaido, Japan

11:00 **Break**

11:30 **Discussion at Poster Walls (Area E 2)**

10:00 **Poster Session, Saal 7 (Room 7)**

**Environmental Tobacco Smoke: Characterization and Field Studies**

Co-Chairpersons:

- J.L. Repace, Dr., Washington (USA)
- M.J. Suess, Dr., Copenhagen (DK)

Presentations (5 min. each):

- Coultas D.B., Samet J.M., Peake G.T., McCarthy J., Spengler J.  
Reliability and Validity of Questionnaire Assessment of Involuntary Tobacco Smoke Exposure
- Eudy L., Heavner D., Stancill M., Simmons J.S., McConnell B.  
Measurement of Selected Constituents of Environmental Tobacco Smoke in a Winston-Salem, North Carolina Restaurant
- Hammond S.K., Coghlin J., Leaderer B.P.  
Field Study of Passive Smoking Exposure with Passive Sampler
- Klus H., Begutter H., Ball M., Intorp M.  
Environmental Tobacco Smoke in Real Life Situations

## Friday, 21 August 1987

- Ryan P.B., Spengler J.D., Treitman R.D., Soczek M.L., Yanagisawa Y., Wallace L.A., Billick L.H.  
Nitrogen Dioxide Exposure in Greater Boston: Evaluation of Personal Monitoring

10:45

Break

11:15

Discussion at Poster Walls (Area C3)

10:00

Poster Session, Saal 6 (Room 6)

### Radon: Sources, Interactions and Reduction Measures

Co-Chairpersons:

- L.S. Quindos Poncela, Professor, Albuquerque (USA)
- R.G. Sextro, Dr., Berkeley (USA)

Presentations (5 min. each):

- Burkart W., Cramer R.  
Increased Indoor Radon Levels Due to Actinide Containing Mineral Collections Displayed in Living Areas
- D'Ottavio T.W., Dietz R.N., Kunz C., Kothari B.  
Radon Source Rate Measurements Using Multiple Perfluorocarbon Tracers
- Dundey C.S., Hawthorne A.R., Bull L.A., Cohen M.A., Daffron C.R., Orebaugh C.T., Harper J.P.  
Radon Levels in 300 Houses in Roane County, Tennessee
- Hartwell T.D., Perritt R.L., Sheldon L.S., Cox B.G., Smith M.L., Rizzuto J.E.  
Distribution of Radon Levels in New York State Homes
- Ikeda K., Yoshizawa S., Komine H., Kaminaka S., Abe S.  
Experimental Studies on the Indoor Radon and Radon Daughter Concentrations Build-up in Japanese Houses
- Kokotti H., Raunetmaa T.  
Indoor Radon in Three Similar Two-Story Houses with Different Ventilation Systems



## Tuesday, 18 August 1987

- Phong D.N.  
Effects of the Hot Humid Conditions on Physiological Indices of Young People in Housing Areas in Vietnam

11:45

Break

12:15

Discussion

9:45

Symposium, Saal 4/5 (Room 4/5)

### Particulate Matter and Fibres:

Sources, Characterization and Health Effects

Organizer: M. Lippmann, Dr., New York (USA)

Chair: F. Speizer, Dr., New Haven (USA)

Presentations (15 min. each):

- Fishbein L., O'Neill I.K.  
Metals in Indoor Environments: Sources and Aspects of Bioavailability and Interactions
- Krause C., Dube P., Neumayr V., Schulz C., Wolter R.  
Metal Concentrations in Indoor Dust Samples from German Homes
- Clench-Aas J., Thomassen Y., Levy F.  
The Use of Estimating Exposure to Ambient Lead in Calculating the Air to Blood Lead Ratio
- Marfels H., Spurny K.R.  
Indoor Measurements of Mineral Fibers
- Boone P.M., Rossman T.G., Daisey J.M.  
The Genotoxic Contribution of Woodsmoke to Indoor Respirable Suspended Particles
- Sinclair J.D., Psota-Kelty L.A., Weschler C.J.  
Water Soluble Salts: A Comparison of Indoor-Outdoor Concentrations and Deposition Velocities at Three Office Sites
- Quackenboss J.J., Lebowitz M.D., Crutchfield C.D., Burchin D.  
Indoor-Outdoor Relationships for Particulate Matter and Verification of Exposure Classifications

11:30

Break

12:00

Discussion

## Tuesday, 18 August 1987

9:45 Symposium, Saal 7 (Room 7)

### Volatile Organic Compounds: Characterization and Health Effects

Organizer: H. Knöppel, Dr., Ispra (I)  
Chair: H. Greim, Professor, München (D)

Presentations (15 min. each):

- Kjaergaard S., Mølhave L., Pedersen O.F.  
Human Reactions to Indoor Air Pollution:  
n-Decane
- Krause C., Mailahn W., Nagel R., Schulz C.,  
Seifert B., Ullrich D.  
Occurrence of Volatile Organic Compounds in  
the Air of 500 Homes in the Federal Republic of  
Germany
- Seifert B., Schulz C., Steinbach I., Ullrich D.,  
Mailahn W.  
Seasonal Variation of Concentrations of Volatile  
Organic Compounds in Selected German Homes
- Hartwell T.D., Pellizzari E.D., Perritt R.L.,  
Whitmore R.W., Zelon H.S.  
Comparison of Volatile Organic Levels Between  
Sites and Seasons for the Total Exposure  
Assessment Methodology Study
- Wallace L.A., Hartwell T.D., Perritt K.,  
Sheldon L.S., Michael L., Pellizzari E.D.  
The Influence of Personal Activities on Exposure  
to Volatile Organic Compounds
- Kliest J., Fast T., Boleij J.S.M., van de Wiel H.,  
Bloemen H.  
The Relation between Soil Pollution and Indoor  
Air Pollution with Volatile Organic Compounds
- Wolkoff P.  
Sampling of VOC Indoors Under Condition of  
High Time Resolution

11:30 Break

12:00 Discussion



## Friday, 21 August 1987

8:00 Symposia Summeries, Saal 3 (Hall 3)  
(Symposia of Thursday Morning)  
Chair: B. Berglund, Dr., Stockholm (S)

### Plenary Lectures, Saal 3 (Hall 3)

8:30 Public Policy Implications of Exposure  
to Indoor Pollution  
K. Sexton, Dr., Washington (USA)

9:00 Assessing the Relative Risk of Indoor  
Exposures and Hazards, and Future Needs  
Th. Lindvall, Professor, Stockholm (S)

10:00 Poster Session, Saal 4/5 (Room 4/5)

### Combustion Gases: Exposure and Health Effects

Co-Chairpersons:  
W. Jedrychowski, Professor, Cracow (PL)  
J. Spengler, Professor, Boston (USA)

Presentations (5 min. each):

- Houthuijs D., Remijn B., Brunekreef B.,  
de Koning R.  
Exposure to Nitrogen Dioxide and Tobacco  
Smoke and Respiratory Health of Children
- Jedrychowski W., Tobiasz-Adamczyk B.,  
Mróz E., Gomola K.  
What Effect Does Indoor Air Pollution due to  
Domestic Cooking Have on the Chest Problems  
of Elderly Women?
- Lewtas J., Claxton L.D., Mumford J.L.  
Human Exposure to Mutagens from Indoor  
Combustion Sources
- McCarthy S.M., Yarmac R.F., Yocom J.E.  
Indoor Nitrogen Dioxide Exposure: The  
Contribution from Unvented Gas Space Heaters
- Morand M.T., Stock T.H.  
The Estimation of Personal Exposure to  
Residential Gaseous Air Pollutants
- Quraishi T., Todd J.  
Effects of Domestic Wood-Burning on Indoor  
Air Quality - An Overview

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## Thursday, 20 August 1987

- Witek Jr. T.J., Schachter E.N., Tosun T., Leaderer B., Beck G.J.  
Assessment of Acute Pulmonary Effects of Formaldehyde in an Environmental Chamber Test Facility

16:45 Break

17:15 Discussion at Poster Walls (Area H2)

15:15 Workshop, Saal 10 (Room 10)

### The Danish Town Hall Study Leader: P. Skov, Dr., Copenhagen (DK)

- Franck C., Skov P.  
Objective Signs of Eye Irritation in Buildings Suspected of Causing Indoor Climate Problems
- Valbjørn O., Skov P.  
Influence of Indoor Climate on the Sick Building Syndrome Prevalence
- Nielsen P.A.  
Potential Pollutants - Their Importance to the Sick Building Syndrome and Their Release Mechanism

18:00 Introducing the New President, Saal 3 (Hall 3)



INDOOR AIR '87

## Tuesday, 18 August 1987

9:45

Poster Session, Saal 6 (Room 6)

### Measures to Guarantee Adequate Indoor Air Quality

Co-Chairpersons:

- I.H. Billick, Dr., Chicago (USA)
- J.M. Dave, Professor, New Delhi (IND)

Presentations (5 min. each):

- Alevantis L.E., Hayward S.B.  
A Computer-Controlled System for Measuring Building Air Exchange Rates Using Sulfur Hexafluoride as a Tracer Gas
- Bugaj A.  
New Concept of Air Distribution in Operating Room
- Cole R.J., Sterling E.M.  
Designing Office Buildings for Improved Environmental Quality
- Drangsholt F.  
Ventilation by Demand
- Fujii S., Boelman E.C.  
Characteristics of Concentration Changes in a Clean Room
- Georgakis K.S., Smith J.W., Goodfellow H.D.  
The Use of Tracer Gas and Analytical Models to Study Dilution and Recirculation from Laboratories
- Guttman K.  
Proposed Method of Indoor Air Pollution Control by Dilution with Outside Air
- Hagenbruch D.  
Fan Standards in Clean-Room Technology
- Matthews T.G., Thompson C.V., Monar K.P., Dudley C.S., Hawthorne A.R., Harper J.P., Williams A.B.  
Impact of HVAC Operation and Leakage on Ventilation and Intercompartment Transport: Studies in a Research House and 39 Tennessee Valley Homes
- Tanaka T., Matsumoto T.  
Evaluation of Performance of VAV System in Super Energy Conservation Building

## Tuesday, 18 August 1987

11:00 Break

11:30 Discussion at Poster Walls (Area G1)

9:45 Poster Session, Saal 8 (Room 8)

### "Sick Buildings": Case Studies

Co-Chairpersons:

P.J. Dennis, Dr., Porton Down (GB)  
O. Valbjørn, Dr., Hørsholm (DK)

Presentations (5 min. each):

- Berglund B., Berglund U., Lindvall Th., Lundin L.  
Air Quality in a Sick Library over a Period of 16 Weeks
- Finnegan M.J., Pickering A.C.  
Prevalence of Symptoms of the Sick Building Syndrome in Buildings without Expressed Dissatisfaction
- Finnegan M.J., Pickering A.C., Gill F.S., Ashton I.  
Negative Ions and the Sick Building Syndrome
- Hedge A., Sterling E.M., Collett C.W., Mueller B., Robson R.  
Indoor Air Quality Investigation as Psychological Stressor
- Helsing K.J., Billings C.E., Conde J.  
Cure of a Sick Building: A Case Study
- Konopinski V.J.  
Gaseous Pollutants in a New-Office Building
- Morris L., Hawkins L.  
The Role of Stress in the Sick Building Syndrome
- Norbäck D., Torgen M.  
A Longitudinal Study of Symptoms Associated with Wall-to-Wall Carpets and Electrostatic Charge in Swedish School Building
- Pöhlmann L., Pöhlmann B.  
Observations on the "Sick Building Syndrome" in a Newly Built Large Hospital
- Potting J., van de Sandt P., ter Haar Romeny-Wachter I., Brunekreef B., Boleij J.S.M.  
Health Complaints, CO<sub>2</sub> Levels and Indoor Climate in Dutch Schools



INDOOR AIR '87

## Thursday, 20 August 1987

15:15

Poster Session, Saal 9 (Room 9)

### Odours, Irritants and Formaldehyde

Co-Chairpersons:

T. Engen, Professor, Providence (USA)  
M. Hangartner, Dr., Zürich (CH)

Presentations (5 min. each):

- Ahlstrom R., Berglund B., Berglund U., Engen T., Lindvall T.  
Odor Perception in Smokers, Non-Smokers and Passive Smokers
- Arundel A., Collett C., Sterling E., Steeves J.  
Low Relative Humidity and Eye, Nose, Throat and Skin Irritation
- Berglund B., Berglund U., Högman L., Johansson I., Lindvall T.  
The Psychophysics of Formaldehyde Odor
- Cain W.S.  
A Functional Index of Human Sensory Irritation
- Crump D.R., Gardiner D.  
Sources and Concentrations of Aldehydes and Ketones in Indoor Environments in the U.K.
- Engen T.  
Adaptation to Odors
- Howlett Jr. C.T., Newton L.R., Stevens K.R.  
Formaldehyde: A Case Study
- Keller R., Hümpel P.  
Air and Water Analysis of Formaldehyde and of Other Aldehydes
- Konopinski V.J.  
Formaldehyde Sensitivity and Control
- Marutzky R.  
Formaldehyde Injuries in Prefabricated Houses: Causes, Prevention and Reduction
- Meyer C.B., Endrödy E., Sundin B., Månsson B.  
Variations of Formaldehyde Exposure in Homes and Office Buildings
- Raab K.H.  
Risk Assessment of Odor Counteraction
- Strav H., Oehme M.  
Convenient Method for Determination of Sub-ppb to ppm Levels of C<sub>1</sub>-C<sub>6</sub> Aldehydes Using Solid Adsorbent Sampling

## Thursday, 20 August 1987

15:15

Poster Session, Saal 8 (Room 8)

### Sources of Volatile Organic Compounds and their Emissions

Co-Chairpersons:

H. Ozkaynak, Dr., Cambridge (USA)  
M. Sonneborn, Dr., Berlin (D)

Presentations (5 min. each):

- Gustafsson H.N.O.  
Proposal of an „Euro Chamber“ for Testing Formaldehyde and Other Indoor Air Pollutants
- Levin H.  
A Procedure Used to Evaluate Building Materials and Furnishings for a Large Office Building
- Ohrbach K.-H., Matuschek G., Kettrup A.  
Pyrolysis of Polymeric Materials for Construction, Room Decoration and Insulation
- Reist P.C., Reaves J.C., White J.B.  
Developmental Status of the Indoor Air Source Emissions Database
- Rothweiler H., Knutti R., Schlatter C.  
Formaldehyde in Indoor Air
- Sheldon L.S., Michael L.C., Pellizzari E.D., Wallace L.  
Use of a Portable Gas Chromatograph for Identifying Sources of Volatile Organics in Indoor Air
- van der Wal J.F., Moons A.M.M., Steenlage K.  
Thermal Insulation as a Source of Air Pollution
- White J.B., Leaderer B.P., Boone P.M., Hammond S.K.  
Characterization of Particle and Organic Emissions from Unvented Kerosene Space Heaters
- Wolkoff P., Nielsen G.D.  
Carbonless Copy Paper as a Potential Non-Building Indoor Irritant

16:30

Break

17:00

Discussion at Poster Walls (Area A 2)



## Tuesday, 18 August 1987

11:00

Break

11:30

Discussion at Poster Walls (Area D 1)

9:45

Poster Session, Saal 10 (Room 10)

### Combustion Gases: Analysis and Concentration Levels

Co-Chairpersons:

E. Lahmann, Professor, Berlin (D)  
D. Moschandreas, Dr., Chicago (USA)

Presentations (5 min. each):

- Atkins D.H.F., Law D.V.  
Indoor-Outdoor Nitrogen Dioxide Concentration Ratios for Homes with Gas and Electric Cooking
- Baker P.E., Cunningham S.J., Becker E.W., Colome S.D., Wilson A.L.  
Evaluation of Housing and Appliance Characteristics Associated with Elevated Indoor Levels of Nitrogen Dioxide
- Baker P.E., Cunningham S.J., Becker E.W., Colome S.D., Wilson A.L.  
An Overview of the Residential Indoor Air Quality Characterization Study of Nitrogen Dioxide
- Colome S.D., Lambert W.E., Castaneda N.  
Performance Characteristics of Palmes Diffusion Tubes Used for Measurement of Nitrogen Dioxide Outside Residential Sites
- Colome S.D., Wilson A.L., Becker E.W., Cunningham S.J., Baker P.E.  
Analysis of Factors Associated with Indoor Residential Nitrogen Dioxide: Multivariate Regression Results
- Colome S.D., Wilson A.L., Becker E.W., Cunningham S.J., Baker P.E.  
Temporal Evaluation of Nitrogen Dioxide in Thirty Seven Residences
- Goldstein I.F., Andrews H., Bodian C., Kelley G.  
Variability in Nitrogen Dioxide Readings Within and Between New York Inner-City Apartments
- Hemphill C.P., Ryan P.B., Billick I.H., Nagda N.L., Koontz M.D., Fortmann R.C.  
Estimation of Nitrogen Dioxide Concentrations in Homes Equipped with Unvented Gas Space Heaters

## Tuesday, 18 August 1987

- Kaarakka P., Kanarek M.S., Lawrence J.R.  
Assessment and Control of Indoor Air Pollution  
Resulting from Wood-Burning Appliance Use
- Koontz M.D., Nagda N.L.  
Survey of Factors Affecting NO<sub>2</sub> Concentrations
- Lebret E., Noy D., Boleij J., Brunekreef B.  
Real-time Concentration Measurements of CO  
and NO<sub>2</sub> in Twelve Homes
- Pannwitz K.-H.  
Monitoring of Inorganic Air Contaminants in  
Indoor Environments by Direct Reading  
Diffusion Tubes
- Stetter J.R., Chang S.-C.  
Portable Monitor for the Measurement of Indoor  
NO<sub>2</sub> Concentrations
- Thurston G.D.  
A Field Study of Nitrogen Oxide Levels Inside  
and Outside an International Airport Terminal
- Wilson A.L., Colome S.D., Baker P.E.,  
Cunningham S.J., Becker E.W., Bope W.G.  
Comparison of Passive and Chemiluminescence  
Monitors for Determining One-Week Average  
Nitrogen Dioxide Concentrations

11:15 Break

11:45 Discussion at Poster Walls (Area C2)

### Plenary Lectures, Saal 3 (Hall 3)

14:00 Air-conditioning: New Horizons -  
New Opportunities  
H. Esdorn, Professor, Berlin (D)

14:30 A Solution to the Sick Building Mystery  
P.O. Fanger, Professor, Lyngby (DK)



## Thursday, 20 August 1987

15:15

Poster Session, Saal 6 (Room 6)

### Ventilation Effectiveness

Co-Chairpersons:

E. Mayer, Dr., Holzkirchen (D)  
M. Sandberg, Dr., Gävle (S)

Presentations (5 min. each):

- Bächlin W.  
Pressure Inside Buildings - A Dominant Para-  
meter for Calculating Effective Natural Ventilation
- Fail A., Panzhauser E.  
Natural Shaft Ventilation - Measurement,  
Simulation, Contribution to Basic Ventilation
- Fitzner K.  
Air Outlets for Displacement Flow and Their  
Influence on the Flow Pattern With Various  
Kinds of Heat Sources
- Hain K., Trümper H.  
The Relations of Air Humidity in Dwellings at  
Different Ventilation Systems (Natural &  
Mechanical)
- Hanssen S.O., Mathisen H.M.  
Sick Buildings - A Ventilation Problem?
- Kubo T., Fujii S., Hayakawa I.  
On the Performance of Turbulent Airflow Clean  
Rooms Based on Airborne Particle Counts in a  
Model Room
- Narasaki M., Yamanaka T., Higuchi M.  
Influence of Turbulent Wind on Ventilation
- Niemelä R., Aalto H., Tossavainen A.  
Evaluation of Low-Cost Tracer Techniques for  
Measuring Air Exchange Rates in Buildings
- Norell L.  
Conversion of a Natural Draught Ventilation  
System to Mechanical Exhaust with Heat Pump  
- A Case Study
- Olsson H.  
Increased Ventilation Efficiency in Rooms
- Vercammen M., Leuderer B.P., Dietz R.N.  
Influence of Airflow on the Performance of the  
Perfluorocarbon Tracer Technique for Measuring  
Ventilation Rates

16:15

Break

16:45

Discussion at Poster Walls (Area G2)

**Thursday, 20 August 1987**

**15:15**    **Symposium, Saal 7 (Room 7)**

**Microbiological Indoor Pollutants:  
Sources, Characterization and Health Effects**

Organizer: H. Ruden, Professor/  
H.-J. Monske, Dr., Berlin (D)  
Chair: P. Morey, Dr., Golden Valley (USA)

**Presentations (15 min. each):**

- Tyndall R.L., Dudney C.S., Hawthorne A.R., Jernigan R., Ironside K., Metter P.  
Microflora of the Typical Home
- Morey P., Burge H., Chatigny M., Feeley J., Kreiss K., Otten J., Peterson K.  
Assessment of Non-Pathogenic Bioaerosols in Indoor Environments
- Yoshizawa S., Irie T., Sugawara F., Ozawa S., Kohsaka Y., Matsumae A.  
Microbiological Contamination From Air Conditioning Systems in Japanese Buildings
- Reponen T., Nevalainen A., Raunemaa T.  
Airborne Fungal Spore and Bacteria Levels in Finnish Homes with Different Ventilation Systems
- Holmberg K.  
Indoor Mould Exposure and Health Effects
- Jantunen M.J., Nevalainen A., Rytönen A.-L., Pellikka M., Kalliokoski P.  
The Effect of Humidification on Indoor Air Fungal Spores Counts in Apartment Building
- Finnegan M.J., Pickering A.C., Davies P.S., Austwick P.K.C., Warhurst D.C.  
Amoebae: The Cause of Humidifier Fever?

**17:00**    **Break**

**17:30**    **Discussion**



**Tuesday, 18 August 1987**

**15:15**    **Symposium, Saal 3 (Hall 3)**

**Combustion Gases: Characterization and Health Effects**

Organizer: J. Boleij, Professor, Wageningen (NL)  
Chair: K. Maeda, Professor, Tokyo (J)

**Presentations (15 min. each):**

- Traynor G.W., Aceti J.C., Apte M.G., Smith B.V., Green L.L., Smith-Reiser A., Novak K.M., Moses D.O.  
Macromodel for Assessing Indoor Exposures to Combustion-Generated Pollutants
- Harlos D.P., Spengler J.D., Billick I.  
Continuous Nitrogen Dioxide Monitoring During Cooking and Commuting: Personal and Stationary Exposures
- Colome S.D., Lambert W.E., Castaneda N.  
Determinants of Carbon Monoxide Exposure in Residences of Ischemic Heart Disease Patients
- Lebre E.  
Errors in Exposure Variables and Their Role in Obscuring Exposure-Response Relations: The Case of Indoor Exposure to Nitrogen Dioxide and Fine Particles
- Goldstein I.F., Andrews L.R., Lieber K., Fouttrakis G., Kazembe R., Huang P., Hayes C.  
Acute Exposure to Nitrogen Dioxide and Pulmonary Function
- Berwick M., Leaderer B.P., Stolwijk J.A.J., Zagarinski R.T.  
Association between Nitrogen Dioxide Levels and Lower Respiratory Symptoms in Children Exposed to Unvented Combustion Sources
- Brunekreef B., Fischer P., Houthuijs D., Remijn B., Boleij J.  
Health Effects of Indoor NO<sub>2</sub> Pollution

**17:00**    **Break**

**17:15**    **Discussion**

## Tuesday, 18 August 1987

15:15 Symposium, Saal 4/5 (Room 4/5)

### Measures to Guarantee Adequate Indoor Air Quality

Organizer: P.O. Fanger, Professor, Lyngby (DK)  
Chair: O. Seppänen, Professor, Helsinki (SF)

Presentations (15 min. each):

- Komine H., Yoshizawa S., Tochihara Y., Kimura E., Ohnaka T.  
The Investigations on IAQ and Subjective Evaluations of Occupants for Indoor Environments in Japanese Office Buildings
- Savolainen T., Raunemaa T., Wellman K.  
Automatic Measurement and Data Collection System on Indoor Air Study at Three Small Housing Flats
- Jokl M.V., Rohles F.H.  
Improving Occupant Well-Being with Ionized Air
- Lundqvist G.R., Aalvikke C.  
Airborne and Settling Particulates in a Day-Care Institution: Field and Exposure Chamber Studies
- Weschler C.J., Shields H.C.  
A Detailed Study of the Effects of Ventilation, Filtration and Outdoor Air on the Composition of Indoor Air at a Telephone Office Building
- Ancker K., Göthe C.-J., Bjurström R.  
A Quantitative Method for Measuring Air Recirculation
- Seppänen O.A.  
Ventilation and Indoor Air Quality
- Trepte L., Le Marie A.  
Minimum Ventilation Rates and Ventilation Strategies

17:15 Break

17:30 Discussion



## Thursday, 20 August 1987

17:00 Break

17:30 Discussion

15:15 Symposium, Saal 4/5 (Room 4/5)

### Controls: Source Modification and Air Cleaning

Organizer: D. Grimsrud, Dr., Berkeley (USA)  
Chair: J. Sundell, M.Sc., Solna (S)

Presentations (15 min. each):

- Godish T., Rouch J.  
Control of Residential Formaldehyde Levels by Source Treatment
- Nazaroff W.W., Cass G.R.  
Mass-Transfer Aspects of Pollutant Removal at Indoor Surfaces
- Klein C.F., Relwani S.M., Moschandreas D.J.  
Evaluation of a Proprietary Detector as an Indoor Air Quality Sensor
- Relwani S.M., Moschandreas D.J., Billick I.H.  
Indoor Air Quality Control Capabilities of Desiccant Materials
- Kettrup A., Klusmeier W., Ohrbach K.-H.  
A New Filter System for Indoor Pollutant Separation (Particles, Organic and Inorganic Gases)
- Kimmel J.  
Performance of Electrostatic Precipitators in Restaurants
- Sandberg M., Mellin A.  
Artificial Electrostatic Fields as Air Cleaning Systems in Rooms

17:00 Break

17:30 Discussion

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## Thursday, 20 August 1987

- 9:45** Workshop, Saal 10 (Room 10)  
**Fungal Spores in Indoor Air**  
 Leaders:  
 F. Staib, Professor/G. Kunkel, Professor, Berlin (D)
- 
- 14:00** Symposia Summaries, Saal 3 (Hall 3)  
 (Symposia of Wednesday Morning)  
 Chair: B. Berglund, Dr., Stockholm (S)
- 
- 14:30** Plenary Lecture, Saal 3 (Hall 3)  
**Indoor Air Pollution Control**  
 D. Moschandreas, Dr., Chicago (USA)
- 
- 15:15** Symposium, Saal 3 (Hall 3)  
**Policy and Strategies**  
 Organizer: D. Walkinshaw, Dr., Ottawa (CDN)  
 Chair: R. Türek, Dr., Bonn (D)
- Presentations (15 min. each):**
- Girman J., Wesolowski J., Jenkins P.  
The Role of Total Exposure in Air Pollution Control Strategies
  - Oatman L., Lane C.A.  
Development of a Comprehensive Indoor Air Quality Program: The Minnesota Experience
  - Herwager S.D., Rowan S.S.  
Tradeoffs Between Energy and Indoor Air Quality Considerations
  - Suess M.J.  
Indoor Air Quality: Radon and Formaldehyde
  - Nagda N.L., Koontz M.D., Reeter H.E., Nitrong G.D.  
Design of a Statewide Radiation Survey
  - Mage D.L., Walkinshaw D., Harper J., Teichman K.  
A Proposed Joint U.S.-Canada Study of the Factors Leading to Indoor Air Quality Concerns in the Non-Industrial Workplace
  - Hansen L.  
Presentation and Evaluation of a Step-Wise Procedure in Solving Indoor Climate Problems



## Tuesday, 18 August 1987

- 15:15** Symposium, Saal 7 (Room 7)  
**Indoor Air Pollution in Developing Countries**  
 Organizer: K.R. Smith, Dr., Honolulu (USA)  
 Chair: M.R. Pandey, Professor, Kathmandu (Nepal)
- Presentations (15 min. each):**
- Cáceres A., Cáceres E.  
Lorena Stoves Acceptance and Household Environment Improvement in Guatemala
  - Mumford J.L., Chapman R.S., Harris D.B., He X.Z., Cao S.R., Xian Y.L., Li X.M.  
Lung Cancer and Indoor Exposure of Unvented Coal and Wood Combustion Emissions in Xuan Wei, China
  - Hu H.-S., Liu Y.-C.  
Evaluation of Indoor Air Pollution and its Effect on Human Health in Beijing Rural Areas
  - Lui L., Wang L.H.  
The Effects of Cooking Fuels on Respiratory Symptoms, Lung Functions, and Carboxyhemoglobins of Non-Smoking Women
  - Pandey M.R., Neapane R.P., Gautam A.  
Domestic Smoke Pollution and Acute Respiratory Infection in Nepal
  - Kim Y.-S., Yanagisawa Y., Zong M.-S.  
Personal, Indoor and Outdoor NO<sub>2</sub> Measurements in Korea
  - Ramakrishna J.  
Cultural, Technological and Environmental Factors Influencing Indoor Air Pollution in Rural India
  - Mishra U.C.  
Indoor Air Quality in India
  - Aggarwal A.L., Chatterjee S.K.  
Indoor Exposure to Auto Exhaust Pollution on Urban Street Canyon in a Less Developed Country: India
  - Boleij J.S.M., Ruigewaard P., Hoek F., Thairu H., Wafuta E., Onyango F., de Koning H.  
Indoor Air Quality in the Maragua Area, Kenya

**17:45** Discussion

## Tuesday, 18 August 1987

15:15 Poster Session, Saal 6 (Room 6)

### Hyperreactivities and Allergies

Co-Chairpersons:

- T. Irie, Dr., Tokyo (J)
- M. Schata, Dr., Mönchengladbach (D)

Presentations (5 min. each):

- Dave J.M., Anwikar A.K.  
Protein and Amino Acids (Allergens)
- Dewair M.  
Humoral Immune Responses in Hypersensitivity Pneumonitis
- Goldstein I.F., Reed C.E., Swanson M.C.  
Aeroallergens in New York Inner-City Apartments
- Johnson A.R., Rea W.J., Butler J.R., Fenyves E.J.  
Indoor Pollution - Clinical Evaluation and Treatment
- Rogers S.A.  
Diagnosing the Tight Building Syndrome
- Schata M., Jorde W., Elixmann J.H., Linskens H.F.  
Allergies to Moulds Caused by Fungal Spores in Air-Conditioning Plants

16:00 Break

16:30 Discussion at Poster Walls (Area D3)

15:15 Poster Session, Saal 8 (Room 8)

### Radon: Surveys

Co-Chairpersons:

- G.A. Swedjemark, Dr., Stockholm (S)
- S. Yoshizawa, Dr., Tokyo (J)

Presentations (5 min. each):

- Dunn J.E., Henschel D.B.  
Statistical Aspects of Autoregressive Models in the Assessment of Radon Mitigation
- Graeffe G., Keskinen J., Janka K., Lehtimäki M.  
Indoor Ion Concentration



## Thursday, 20 August 1987

9:45

Poster Session, Saal 8 (Room 8)

### Policy and Strategies

Co-Chairpersons:

- M.A. Berry, Dr., Research Triangle Park (USA)
- G. Vollmer, Dr., Bonn (D)

Presentations (5 min. each):

- Armstrong V.C., Walkinshaw D.S.  
Development of Indoor Air Quality Guidelines in Canada
- Bossenmayer H.  
Spray Applied Asbestos and Comparable Products
- Ferahian R.H.  
Violations of Building Bylaws, Energy Conservation and Bad Maintenance as Causes of Indoor Air Pollution
- Gammage R.B., Kerbel W.S.  
American Industrial Hygiene Association Indoor Environmental Quality Reference Manual
- Nero Jr. A.V.  
Elements of Strategies for Control of Indoor Air Quality
- Oatman L.  
Regulating Formaldehyde in Minnesota
- Price P., Grossman M.  
Smoking in the Workplace - Canadian Law
- Thron R.W., Thompson M.J., Oatman L.  
Regulating Smoking in Public Buildings and Workplace
- Zingg M.  
Questionnaire - A Possibility of Treating Indoor Problems

10:45

Break

11:15

Discussion at Poster Walls (Area B1)

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Thursday, 20 August 1987

11:30 Break

12:00 Discussion

9:45 Poster Session, Saal 6 (Room 6)

**Controls: Source Modification and Air Cleaning**

Co-Chairpersons:

WW. Nazaroff, Dr., Pasadena (USA)

E. Rødahl, Professor, Trondheim (N)

Presentations (5 min. each):

- Chiang P.-C., Chang P.  
Low Cost Control Technology for VOCs Emissions
- Hangartner M., Wanner H.-U.  
Test Criteria for Air Cleaners
- Monn Ch., Hangartner M., Wanner H.-U.  
Indoor Measurements of Nitrogen Dioxide and Sulfur Dioxide in Mechanically and Naturally Ventilated Rooms Compared with Outdoor Measurements
- Narasaki M.  
Ventilation Requirements in Building for Control of Body Odor
- Novosek D., Relwani S.M., Moschandreas D.J.  
Development of a Desiccant Based Air Conditioner with Indoor Pollution Control Capabilities
- Panzhauser E., Heindl W., Fail A.  
Advisory Model Formaldehyde
- Sammaljärvi E.  
How to Build a Healthy House

10:45 Break

11:15 Discussion at Poster Walls (Area E3)



Tuesday, 18 August 1987

- Henschel D.B., Scott A.G.  
Some Results from the Demonstration of Indoor Radon Reduction Measures in Block Basement Houses

- Jansson B., Tholander M., Axelsson O.  
Exposure to Radon in Swedish Dwellings - Attitudes and Elimination

- Jönsson G.  
Some Radon Measurements Indoors and in Ground in Sweden

- Keskinen J., Lehtimäki M., Janka K.  
Reduction of Radon Progeny Concentration by Means of Unipolar Air Ionization

- Moghissi A.A., Seiler F.A., Dellarco M.J.  
Enhancement of Exposure to Radon Progeny as a Consequence of Passive Smoking

- Quindos L.S., Fernandez P.L., Soto J.  
Building Materials as a Source of Exposure in Houses

- Sanchez D.C., Hubbard L.M., Harje D., Turk B.H.

- The Use of Diagnostic Measurements to Enhance the Selection and Effectiveness of Radon Mitigation for Detached Dwellings

- Strindberg O., Norell L.  
Ventilation Measures in Single-Family Houses with High Radon Concentrations

16:15 Break

16:45 Discussion at Poster Walls (Area E1)

15:15 Poster Session, Saal 9 (Room 9)

**"Sick Buildings": Indoor Air Quality Research**

Co-Chairpersons:

M.J. Finnegan, Dr., London (GB)

H.-G. Meyer, Professor, Berlin (D)

Presentations (5 min. each):

- Berglund B., Berglund U., Engen T.  
Do "Sick Buildings" Affect Human Performance? How Should One Assess Them?

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## Tuesday, 18 August 1987

- Collett C.W., Sterling E.M., McIntyre E.D., Steeves J.F., Weinkam J.J.  
The Building Performance Database: An Analytical Tool for Indoor Air Quality Research
- Harrison J., Pickering A.C., Finnegan M.J., Austwick P.K.C.  
The Sick Building Syndrome - Further Prevalence Studies and Investigations of Possible Causes
- Hedge A., Wilson S., Burge P.S., Robertson A.S., Harris-Bass J.  
Indoor Climate and Employee Health in Offices
- Knötg H., Kurtz I., Panzhauser E.  
"Sick Buildings" - A Phenomenon of Internal Information Processing?
- Lercher P., Hörtznagl J., Kofler W.W.  
Possible Combined Health Effects in White Collar Workers by Complex Exposures
- Nguyen V.H., Martel J.-G.  
A Field Study in Three Office Towers in Québec, Canada
- Norback D., Rand G., Michel I., Amcoff S.  
Overfrequencies of Skin and Airway Symptoms Among Personnel in Sick Buildings and Polluted Industrial Environments in Relation to Exposure
- Rohles Jr. F.H., Woods J.E., Morey P.R.  
Occupant Assessment of the Indoor Environment
- Sammaljärvi E.  
A Hypothesis on the Mechanisms of the Heat Effects of Mechanical Ventilation and Warm Air Heating
- Stenberg B.  
Skin Complaints in Sick Buildings

16:30 Break

17:00 Discussion at Poster Walls (Area D2)



## Thursday, 20 August 1987

- Lauridsen J., Muhaxheri M., Clausen G.H., Fanger P.O.  
Ventilation and Background Odor in Offices

11:45 Break

12:15 Discussion

9:45 Symposium, Saal 7 (Room 7)

### Sources of Volatile Organic Compounds and their Emissions

Organizer: W.G. Tucker, Dr., Research Triangle Park (USA)

Chair: J. Girman, Dr., Berkeley (USA)

Presentations (15 min. each):

- Özkaynak H., Ryan P.B., Wallace L.A., Nelson W.C., Behar J.V.  
Sources and Emission Rates of Organic Chemical Vapors in Homes and Buildings
- Tichenor B.A.  
Organic Emission Measurements via Small Chamber Testing
- Berglund B., Johansson I., Lindvall T.  
Volatile Organic Compounds from Building Materials in a Simulated Chamber Study
- Girman J., Alevantis L., Kullasingam G., Petreas M., Webber L.  
Bake-Out of An Office Building
- Knöppel H., Schauenburg H.  
Screening of Household Products for the Emission of Volatile Organic Compounds
- Hansen T.B.  
Prediction of the Air Concentration Caused by the Use of Household Products Containing Organic Solvents
- Andelman J.B., Wilder L.C., Myers S.M.  
Indoor Air Pollution from Volatile Chemicals in Water

## Thursday, 20 August 1987

- Pershagen G., Svensson C., Hrubec Z.  
Environmental Tobacco Smoke and Lung  
Cancer in Swedish Women
- Olander L., Johansson J., Johansson R.  
Air Cleaners for Tobacco Smoke

11:45

Break

12:15

Discussion

9:45

Symposium, Saal 4/5 (Room 4/5)

### Assessment of Odours, Irritants and Formaldehyde

Organizer: W.S. Cain, Professor, New Haven (USA)  
Chair: H.-U. Wanner, Professor, Zürich (CH)

Presentations (15 min. each):

- Broder I., Corey P., Brasher P., Cole P., Lipa M., Mintz S., Nethercott J.R.  
Comparison of Health of Occupants of Control Homes and Homes Insulated with Urea Formaldehyde Foam Before and After Corrective Work
- Liu K.-S., Huang F.-Y., Hayward S.B., Wesolowski J.J.  
Irritant Effects of Formaldehyde in Mobile Homes
- Quackenboss J.J., Lebowitz M.D., Bronnimann D., Michaud J.P.  
Formaldehyde Exposure and Acute Health Effects Study
- Bach B., Mølhave L., Pedersen O.F.  
Human Reactions During Controlled Exposures to Low Concentrations of Formaldehyde: Performance Tests
- Breunis K., de Groot J.P.  
Relative Humidity of the Air and Ocular Discomfort in a Group of Susceptible Office Workers
- Minamino O.  
Investigation Study between Air Contamination and Odor Sensation in the Office Building
- Fecker I., Hangartner M., Wanner H.-U.  
Measurement of Carbon Dioxide of the Indoor Air to Control the Fresh Air Supply



## Tuesday, 18 August 1987

15:15

Poster Session, Saal 10 (Room 10)

### Semi-Volatile and Particle-Bound Organic Compounds

Co-Chairpersons:

I. Gebefügi, Dr., Neuberberg (D)  
R. Lewis, Dr., Research Triangle Park (USA)

Presentations (5 min. each):

- Hümpel P., Keller R.  
Detection of Small Concentrations of Pentachlorophenol in Air
- Jaquith D.A., McDavit W.M., Reinert J.C.  
Monitoring of Air Levels of Termiticides in Homes in the United States
- Kalinić N., Šega K., Hršak J., Šišović A.  
Phenol Levels in Indoor Air
- Korte F., Gebefügi I.  
Avoidable and Unavoidable Exposition of Indoor Chemicals
- Ma T.-H., Harris M.M.  
Tradescantia-Micronucleus (TRAD-MCN) Bioassay - A Promising Indoor Air Pollution Monitoring System  
(Practical demonstration on Wednesday Morning, 9:00 hours, Salon 21, Lilienthal)
- Qazi A.H.  
Termiticides in Indoor Environments
- Seifert B., Schmahl H.-J.  
Quantification of Sorption Effects for Selected Organic Substances Present in Indoor Air
- Vo-Dinh T., Miller G.H., White D.A., Hawthorne A.R., Mage D.T.  
Indoor Screening of Polycyclic Organic Pollutants: A Field Study in Seventy Homes
- Zsolnay A., Gebefügi I., Korte F.  
Occurrence of Lindane and PCP in Bavarian Buildings
- Zsolnay A., Gebefügi I., Korte F.  
The Use of Factorial Analysis to Estimate Synergistic Effects in the Environment

16:15

Break

16:45

Discussion at Poster Walls (Area A 3)



### Wednesday, 19 August 1987

11:15	Break
11:45	Discussion at Poster Walls (Area B 2)
13:00	Free Afternoon
16:00	<b>Social: "Indoorers go out"</b> Departure by coach from ICC and hotels Bristol Kempinski, Econtel, Excelsior, Novotel Airport. (See Social Programme)
from 22:00	Return by coach to ICC and hotels in the city centre.



### Wednesday, 19 August 1987

11:30	Break
12:00	Discussion
9:45	<b>Symposium, Saal 4/5 (Room 4/5)</b>  <b>Semi-Volatile and Particle-Bound Organic Compounds: Monitoring and Health Effects</b> Organizer: L. Wallace, Dr., Washington (USA) Chair: M. Fugaš, Dr., Zagreb (YU)  Presentations (15 min. each): <ul style="list-style-type: none"><li>● Lewis R.G., Bond A.E. Non-Occupational Exposure to Household Pesticides</li><li>● Lillie Th.H., Barnes E.S. Airborne Termiticide Levels in Houses on United States Air Force Installations</li><li>● Olds K.L. Indoor Airborne Concentrations of Termiticides in Department of the Army Family Housing</li><li>● Oehme M., Knöppel H. Analysis of Low Volatile (&gt; C<sub>10</sub>) and Particle Bound Indoor Pollutants: Assessment of a Sensitive Method and First Results</li><li>● Daisey J.M., Spengler J.D., Kaarakka P. A Comparison of the Organic Chemical Composition of Indoor Aerosols During Woodburning and Non-Woodburning Periods</li><li>● Krause C., Englert N., Dube P. Pentachlorophenol-containing Wood Preservatives: Analyses and Evaluation</li></ul>
11:15	Break
11:45	Discussion

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## Wednesday, 19 August 1987

9:45 Symposium, Saal 7 (Room 7)

### Ventilation Effectiveness in Buildings and Rooms

Organizer: P. Warren, Dr., Watford (GB)  
Chair: H. Bach, Professor, Stuttgart (D)

Presentations (15 min. each):

- Majanen A., Helenius T., Seppänen O.  
Air Quality and Ventilation Efficiency in Residential and Office Buildings
- Holmberg R.B., Folkesson K., Stenberg L.-G., Jansson G.  
Experimental Comparison of Indoor Climate using Various Air Distribution Methods
- Larsson B., Neikter K., Strindehag O.  
Ventilation Efficiency in Clean Rooms
- Nagda N.L., Koontz M.D., Fortmann R.C., Billick I.H.  
Detailed Evaluation of Range-Exhaust Fans
- Kovanen K., Seppänen O., Siren K., Majanen A.  
Turbulent Air Flow Measurements in Ventilated Spaces
- Offermann F.J., Int-Hout D.  
Ventilation Effectiveness and ADPI Measurements of Three Supply/Return Air Configurations

11:15 Break

11:45 Discussion

9:45 Poster Session, Saal 6 (Room 6)

### Multicomponent Field and Laboratory Studies

Co-Chairpersons:

A.R. Hawthorne, Dr., Oak Ridge (USA)  
H.-S. Hu, Professor, Beijing (P.R. China)

Presentations (5 min. each):

- Ammann H.M., Berry M.A.  
Health Risk Profile for Indoor Air
- Baer N.S.  
Air Pollution in Museums, Libraries and Archives: Sources, Effects and Controls



## Wednesday, 19 August 1987

- Elixmann J.H., Linskens H.F., Schata M., Jorde W.  
Can Airborne Fungal Allergens Pass through an Air Conditioning System? Preliminary Results
- Gravesen S.  
Microbiological Studies on Carpets versus Hard Floors in Non-Industrial Occupations
- Jurinski N.B.  
Quantitative Evaluation of Indoor Microbial Contamination on Airborne, Surface and Bulk Samples
- Nevalainen A., Jantunen M., Pellikka M., Pitkänen E., Kalliokoski P.  
Airborne Bacteria, Fungal Spores and Ventilation in Finnish Daycare Centers
- Ohgke H., Geers A., Beckert J.  
Fungal Load of Indoor Air in Historical and Newly Constructed Buildings Used by Public Services
- Raza S.H., Kauser R.  
Indoor Aerobiological Pollution in Certain Indian Domestic Environments
- Seidel K., Bär G., Börmert W., Seeber E.  
Legionellae in Aerosols and Splashwaters in Different Habitats
- Staib F., Seibold M., Heißenhuber M.  
Indoor Air Mycology - Aspergillosis, Mucormycosis and Cryptococcosis Caused by Fungal Spores from Indoor Air
- Streifel A.J., Rhame F.S., Vesley D., Murray B.  
Control of Airborne Fungal Spores in a University Hospital
- Sugawara F., Yoshizawa S.  
Study on the Collection Characteristics of Andersen Biological Air Samplers: Estimation of Size Distribution of Real Aerosols
- TerKonda P.K.  
Sources and Effects of Microbiological Indoor Pollutants
- Tobin R.S., Baranowski E., Gilman A.P., Kuiper-Goodman T., Miller J.D., Giddings M.  
Significance of Fungi in Indoor Air: Report of a Canadian Working Group
- van Wageningen N., Waegemaekers M., Brunekreef B., Boleij J.  
Health Complaints and Indoor Moulds in Relation to Moist Problems in Homes
- Völksch G., Horn H., Günter A.  
Investigations on Individual Humidification

Wednesday, 19 August 1987



Wednesday, 19 August 1987

- Matsuki H., Yanagisawa Y., Spengler J., Kasuga H.  
Urinary Cotinine Measurements for Passive Smokers Using Gas Chromatography and Flame Thermionic Detector with Glass Capillary Column
- McCurdy S.A., Kado N.Y., Schenker M.B., Hammond S.K., Benowitz N.L.  
Measurement of Personal Exposure to Mutagens in Environmental Tobacco Smoke
- Muelenaer P., Reid H., Morris R., Saltzman L., Horstman D., Collier A., Henderson F.  
Urinary Hydroxyproline Excretion in Young Males Exposed Experimentally to Nitrogen Dioxide
- Sanner T., Rivedal E.  
Enhanced Transformation of Syrian Hamster Embryo Cells by Combined Exposure to Cigarette Smoke Extract and Benzo(a)Pyrene or Nickel Sulphate
- Scherer G., Westphal K., Hoepfner I., Adlkofer F.  
Biomonitoring of Exposure to Potentially Mutagenic Substances from Environmental Tobacco Smoke (ETS)
- Yanagisawa Y., Matsuki H., Spengler J.D., Kasuga H.  
Evaluation of Tobacco Smoke Using Urinary Cotinine as an Indicator of Dose and Hydroxyproline as an Indicator of Effects

11:00 Break

11:30 Discussion at Poster Walls (Area D4)

9:45 Poster Session, Saal 10 (Room 10)

#### Microbiological Indoor Pollutants

Co-Chairpersons:

B. Festy, Professor, Paris (F)

K.-W. Horn, Professor, Berlin (DDR)

Presentations (5 min. each):

- Al-Zubaidy T.  
Effects of Aircoolers on City Dwellers
- Binnie P.W.H.  
Airborne Microbial Flora in Florida Homes (Preliminary Study)

- Hawthorne A.R., Matthews T.G., Dudney C.S., Vo-Dinh T., Spengler J.D., Mage D.T.  
Performance of Passive Indoor Air Quality Monitors in a Multipollutant Field Study
- Keskinen J., Kulmala V., Graeffe G., Hautanen J., Janka K.  
Continuous Monitoring of Air Impurities in Dwellings
- Krause C., Kirschner W., Schulz C., Dube P.  
Environment and Health: Survey and Analyses of Environmental Exposure Factors in the Federal Republic of Germany
- Landrus G., Zuthowski M., Rosenzweig-Witherspoon J., Hunter I.  
Effects on Perceived and Measured Air Quality, Health, Absenteeism and Energy Consumption, of Installing Openable Windows in a "Sealed" School
- Large Jr. R.B.  
Indoor Air Quality Within the Home as a Function of Electric or Gas End Utilization
- Matsumura T., Kametani K., Takeda M., Muramatsu S.  
Simultaneous Determination Method of Personal Exposure Levels for Formaldehyde and Nitrogen Dioxide
- Sheldon L.S., Saeger M.L., Cox B.G., Smith M.L., Hartwell T.D., Rizzuto J.  
Determination of the Impact of Infiltration Reduction Measures on House Air Leakage
- van Dongen J.E.F.  
Indoor Air Problems in Different Types of Newly Built Dwellings
- Waldman J.M., Liou P.J., Harkov R., Greenberg A.  
Field Study of Human Exposure to Benzo(a)pyrene in a Community Directly Impacted by a Foundry

11:00 Break

11:30 Discussion at Poster Walls (Area F2)

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## Wednesday, 19 August 1987

9:45

Poster Session, Saal 8 (Room 8)

### Indoor Air Pollution in Developing Countries

Co-Chairpersons:

D.R. Ahuja, Dr., New Delhi (IND)

A. Caceres, Dr., Guatemala City (GCA)

Presentations (5 min. each):

- Aghdaie N.  
Indoor-Outdoor Relationship of Total Suspended Particulate and Inhalable Particulate Matter in Tehran, Iran
- Befekadu F.  
Neglected Environmental Human Requirements in Ethiopian Traditional Houses
- Davidson C.I., Pandey M.R.  
Particulate and Gaseous Pollutants in Residences in Nepal
- Fouladirad J.  
Combustion Gases: Sources, Characteristics and Health Effects
- Gadgil A.  
Indoor Air Quality in Offices and Hospitals in High-Altitude Himalaya
- Jindal S., Prasad R.  
Studies on Environmental Aspects of Cook-Stoves
- Joshi V., Venkatarama C., Ahuja D.R.  
Thermal Performance and Emission Characteristics of Biomass Burning Heavy Stoves with Chimneys
- Mandal A., Prasad R., Guha B.K., Sarkar M.K.  
Mechanism of Smoke Generation in Coal-Fired Chulha and its Means of Elimination
- Manoharachary C., Saibaba M.  
Some Aspects and Prospects of Indoor Aeromycoflora from India
- Raza S.H., Nirmala B., Murthy M.S.R.  
Studies on the Components of Air Borne Dust Particles in Indoors of Secunderabad Railway Station and Mess
- Saibaba M., Manoharachary C.  
Studies on Atmospheric Fungi of Some Indoor Environments (India)



## Wednesday, 19 August 1987

- Smith K.R., Durgaprasad M.B.  
Difficulties in Achieving and Verifying Exposure Reductions in Village Households with Improved Biofuel-fired Cookstoves

11:00

Break

11:30

Discussion at Poster Walls (Area C4)

9:45

Poster Session, Saal 9 (Room 9)

### Environmental Tobacco Smoke: Biomarkers and Health Effects

Co-Chairpersons:

N.J. Haley, Dr., Valhalla (USA)

J. Schlatter, Dr., Schwerzenbach (CH)

Presentations (5 min. each):

- Clausen G.H., Møller S.B., Fanger P.O.  
The Impact of Air Washing on Environmental Tobacco Smoke Odor
- Clausen G.H., Nielsen K.S., Sahin F., Fanger P.O.  
Sensory Irritation from Exposure to Environmental Tobacco Smoke
- Curvall M., Kazemi-Vala E., Enzell C.R., Olander L., Johansson J.  
Inhaled Amount of Tobacco Smoke During Passive Smoking
- Goldstein G.M., Collier A., Etzel R., Lewtas J., Haley N.  
Elimination of Urinary Cotinine in Children Exposed to Known Levels of Side-Stream Cigarette Smoke
- Haley N.J., Adams J.D., Axelrad C.M., Hoffmann D.  
Sidestream Smoke Uptake by Syrian Golden Hamsters in an Inhalation Bioassay
- Hoepfner I., Scherer G., Adlkofer F., Dettbarn G., Grimmer G.  
Urinary Excretion of Hydroxy-phenanthrene after Intake of Polycyclic Aromatic Hydrocarbons
- Jarczyk L., Scherer G., Hoepfner I., Luu H.T., Adlkofer F.  
Intake of Nicotine from Environmental Tobacco Smoke (ETS) via Different Inhalation Routes